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## DESCRIPTION OF PLATES.

### PLATE V.—(*Monilia fructigena.*)

Fig. 1. Blighted peach stem, showing dead persistent, flowers and leaves; *g*, gum exuded near union of blighted and living portion; *w*, stem of two year's growth. Collected some days after the entrance of the fungus.

2. Peach stem collected same day as Fig. 1; *a*, withered persistent flower through which the mycelium entered the stem; *bb*, restricted area of blight, the distal end of the stem being still connected by a narrow isthmus of sound tissue with the parts below; *g*, drop of exuded gum.

3. Enlarged end of blighted stem showing conidia tufts which pushed through the bark on exposure to moist air.

4. Conidiophore and conidia from one of the tufts shown in Fig. 3.

5, 6, 7. Mycelial threads from the gum cavities of the inner bark. (See Plate VI, Fig. 1.)

### PLATE VI.—(*Monilia fructigena*).

Fig. 1. Cross-section of a blighted peach stem, such as Fig. 1 of Plate V, showing a large gum cavity full of active mycelium; *p*. pith; *x*, xylem; *c*, cavity containing remnants of cambium and soft bast and hyphæ; *b*, bast bundles, *cp*, cortical parenchyma; *e*, epidermis. On the opposite side of this stem was a cavity larger than that here shown.

2. Enlarged cross-section of portion of a normal peach stem one year old, for comparison with Fig. 1. The portion destroyed is that included in the brace; (1) Epidermis; (2) subepidermal cells, usually destitute of chlorophyll, but containing coloring matters in solution, *e. g.*, reds or browns; (3) chlorophyll bearing cortical parenchyma; (4) expansion of phloem ray cells; (5) phloem ray cells separating bast bundles; (6) bast bundle—outlines of two others are indicated; (7) large cell containing a crystal of calcium oxalate; (8) phloem ray cells separating the soft bast (4, 5, and 8, destitute of starch); (9) xylem ray cells full of starch; (10) soft bast; (11) cambium; (12) xylem fibers; (13) vessels in the xylem.

3. Longitudinal radial section along the medullary ray of a stem similar to the inner part of Fig. 2, showing wood, cambium, and soft bast with an overlying portion of the ray. *a*, Cells of xylem ray gorged with starch; *b*, cells of phloem ray destitute of starch; *c*, pitted vessel; *d*, wood fibers; *e*, cambium cells; *f*, soft bast. The left part (1) is xylem; the right (2) is the inner part of the phloem, and is the portion destroyed by the Monilia. Sections from which Figs. 2 and 3 were drawn were cut from fresh material at the end of the growing season (November 1).

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## THE IMPROVED JAPY KNAPSACK SPRAYER.

By B. T. GALLOWAY.

(Plates VII-IX.)

Something over three years ago the Japy brothers of Beaucourt, France, designed a knapsack sprayer, which is commended by every one who has used it, for its simplicity, durability and effectiveness. This machine is used largely throughout the vine-growing region of France and a few have been imported into this country. Recently a number of improvements have been made in the sprayer which make it even more valuable, placing it, in fact, in the front rank of machines of this description. For the benefit of American small fruit and vegetable growers, for whom this machine is especially adapted, we give below a full description of it, accompanied by illustrations.

As will be seen by consulting Plates VII–IX the machine in the main consists of a reservoir, pump, air chamber, strainer, lance, and spraying nozzle. The reservoir, with the exception of the bottom, is made of 16-ounce sheet copper and holds a little over 3 gallons. The bottom, to better withstand the strain put upon it when the pump is in use, is made of 20-ounce copper. It is further strengthened by soldering across it, inside the tank, two strips of heavy sheet copper, each 1½ inches wide and 4½ inches long. While speaking of the bottom it may be well to say that the wall of the reservoir projects in a rim beyond it a distance of 1¾ inches, as shown by the two dotted lines *a* and *b* in Fig. 1, *a* being the point where the bottom is placed and *b* the edge of the rim. Both top and bottom of the tank are soldered in and are provided in each case with two openings. The openings in the top, as shown by the black portions in Fig. 2, are for the introduction of the liquid and the piston rod, the small round opening serving for the latter purpose. The white portion *a* in Fig. 2 merely represents the top of the air chamber, which extends to within 1½ inches of the top of the tank. It will be understood, of course, that this opening, which is 4⅛ by 7⅜, is clear throughout, the top of the air chamber offering no obstruction whatever to the introduction of the liquid. Into the large opening is fitted a brass wire strainer having a number forty mesh. The strainer is shown at Fig. 4. It is made by simply soldering the brass wire already mentioned to a collar of sheet copper three-fourths of an inch in height. Across the strainer is soldered a narrow strip of copper or piece of heavy brass wire which serves the double purpose of a brace and handle. The strainer is made with a narrow flange at the top, in order that it may be held in place by a shoulder projecting from the edge of the opening in the tank. The opening is closed by means of a top, represented at Figs. 5 and 6. It is made of copper and is so simple in construction that further description is unnecessary. The two openings in the bottom of the tank are shown at *a* and *b* in Fig. 3. Into these is fitted the combined pump cylinder and air chamber, the ends *e* and *f* in Fig. 7 being the only parts that project outside the tank. By means of the two screw caps *a* and *b* in Fig. 3 the whole of this part of the machine is held firmly in place against the bottom of the reservoir, washers, of course, being used to prevent leakage.

Between the cap *a* and the tank there is fitted a small casting which serves to conduct the liquid from the air chamber into the hose shown at *c*, Fig. 3. The pump and air chamber are shown at Figs. 7 and 8, the plunger being removed from the cylinder merely to illustrate it more clearly. The air chamber *a* and the pump cylinder *b* are simply pieces of 2½ inch brass pipe 12½ and 4⅝ inches long respectively. Both are soldered to the casting C, a bottom view of which is shown at Fig. 9. The top of the air chamber is closed by means of a cap of heavy sheet copper *d*, soldered as firmly as possible to the brass pipe. The plunger which works in the cylinder consists of a cone-shaped brass casting into which is fastened a similarly shaped piece of soft rubber, the base of the latter being a little larger than that of the former.

These various parts are all plainly shown at Fig. 8, *a* being the piston rod, *b* the cone-shaped brass receptacle for holding the piece of soft rubber shown at *c*. In Fig. 10 are shown the parts used in fastening the rubber to the brass cone, *a* being the end of the piston rod with screw thread, *b* tap, and *c* casting which fits between the tap and cone and holds the rubber in place. This casting is shown enlarged at Fig. 9. The manner of working the pump will be better understood by consulting Fig. 11 in which the flow of the liquid is represented by the arrows. When the piston is raised the liquid is drawn in at the opening *a*. The downstroke forces the liquid through the pipe *b* into the air chamber *c* and at the same time closes the ball valve *d*. Another upstroke is made and the ball valve *e* closes the opening at that point, thereby preventing the liquid from rushing back into the pump cylinder. This process being repeated the liquid remains under constant pressure in the air chamber and as a result it is forced through the hose, lance and nozzle shown in Fig. 1 in a constant spray. The lance and nozzle we use on this machine is the well known improved Vermorel. The other parts of the apparatus, such as the straps, handle, lever, etc., need no special mention, as any machinist will be able to see from the drawings how they are made and used. For the further benefit of any one desiring to manufacture the pump the dimensions of the various parts are given in detail at the close of the article.

As regards cost, the machine with two lances and nozzles sells in France for 40 francs, or about $8. The duty, transportation, and other charges on the pump will bring the cost, laid down in this country, up to about $20. This is for a single machine. Where a number are ordered at a time they can be delivered here for about $15 each. Estimating labor at 40 cents an hour the machine complete, as we have described it, can be made in this country for about $11.50.

If special appliances are used and the machines are turned out in large numbers, we see no reason why the actual cost of manufacturing could not be further reduced to $10.50 or even to $10 each. Manufacturing them at this price, it seems to us that they could be put on the market for $12 or $14 at a fair profit.

### DIMENSIONS OF PARTS DESCRIBED ABOVE.

Reservoir, 17x13½x4½ inches.
Opening for liquid, 4⅛x7⅜ inches.
Opening for piston rod, 6/8 of an inch in diameter.
Opening for introduction of air chamber (*a* and *b*, Fig. 3), ¾ inch in diameter.
Strainer, ⅜x4⅛x¾ inches.
Air chamber, 2½x12½ inches.
Pump cylinder, 2½x4⅜ inches.
Diameter of piston rod at top, ½ inch.
Length of piston rod, 13½ inches.
Diameter of cone-shaped casting (Fig. 9), 2½ inches.
Height of cone-shaped casting, 2 inches.

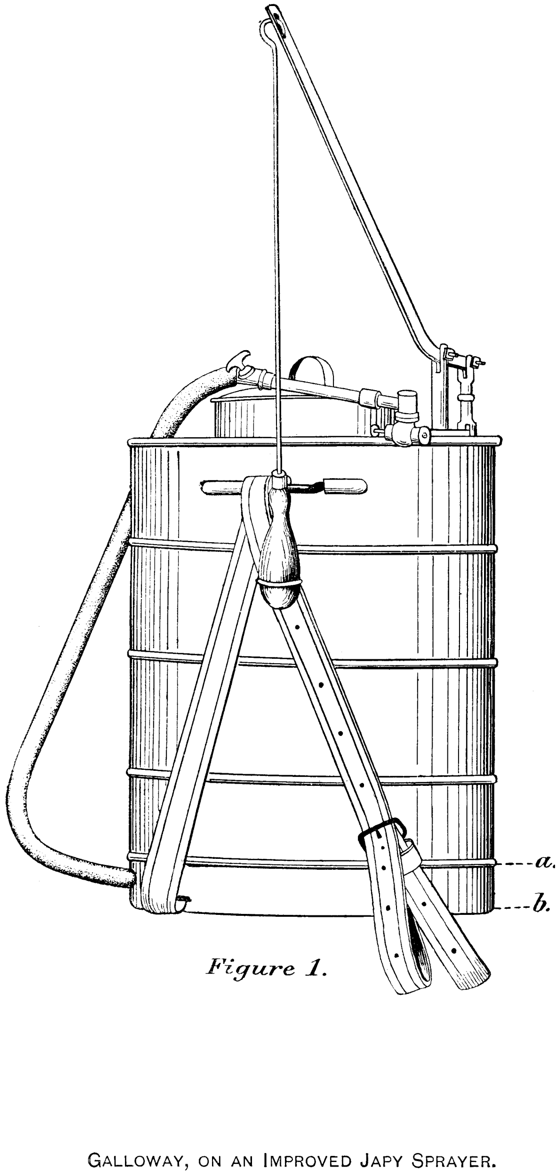

*Figure 1.*

GALLOWAY, ON AN IMPROVED JAPY SPRAYER.

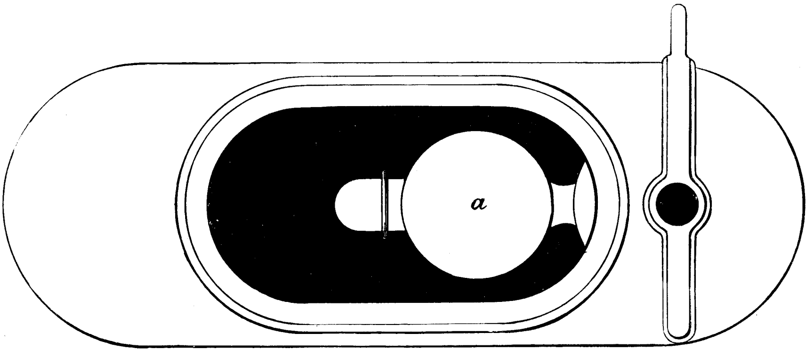

Figure 2.

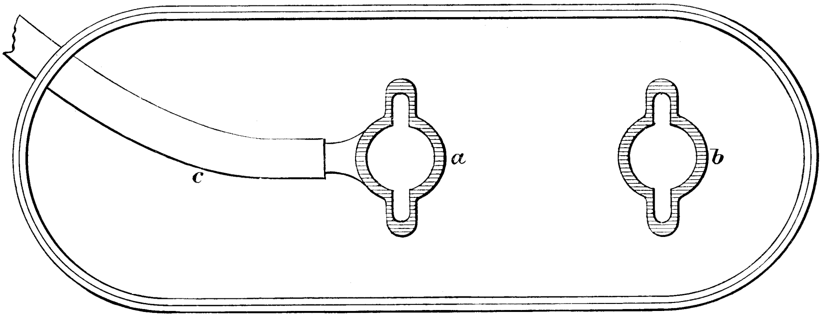

Figure 3.

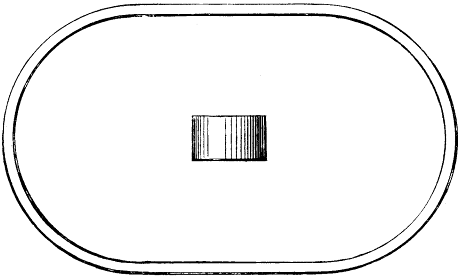

Figure 5.

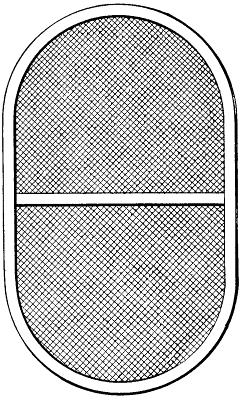

Figure 4.

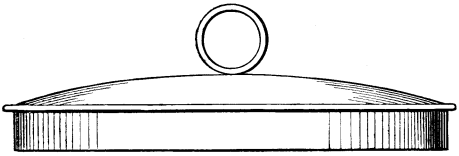

Figure 6.

GALLOWAY, ON AN IMPROVED JAPY SPRAYER.

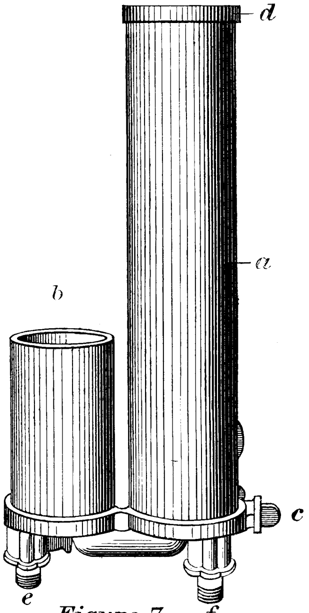

*Figure 7.*

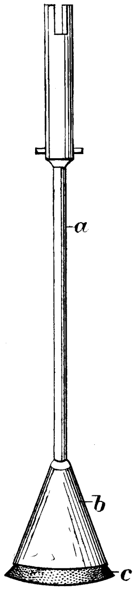

*Figure 8.*

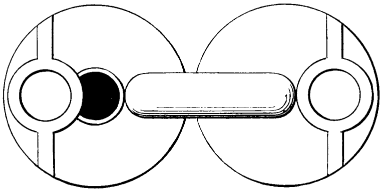

*Figure 9.*

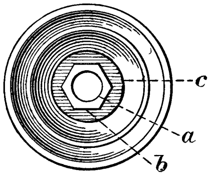

*Figure 10.*

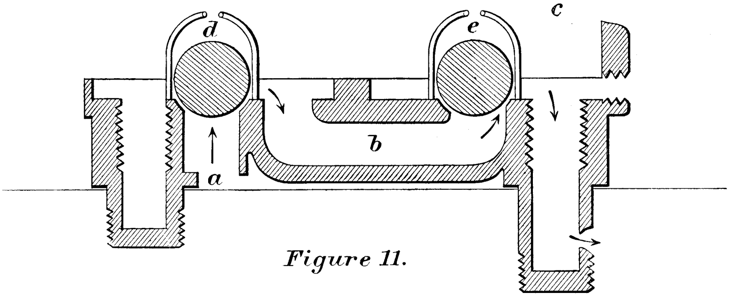

*Figure 11.*

GALLOWAY, ON AN IMPROVED JAPY SPRAYER.